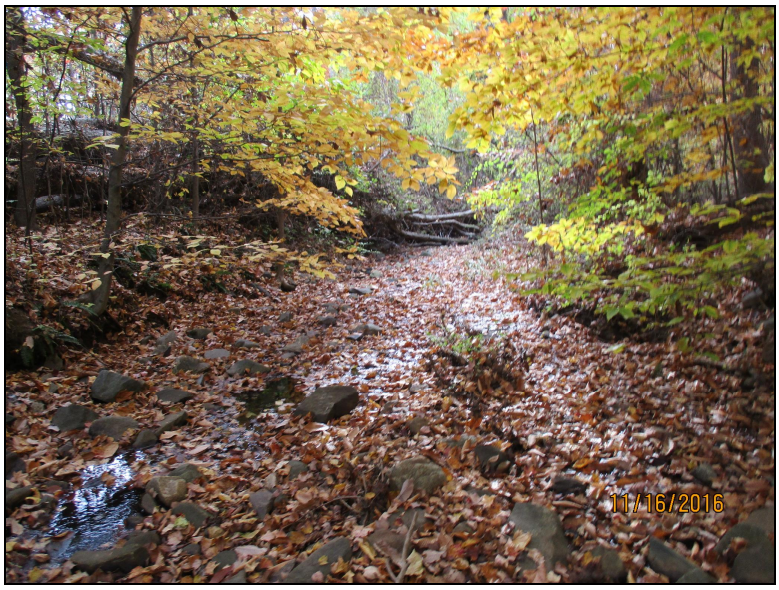
Appendix F2 – Assessment of Controls (Stormwater Management Assessment)

Wexford 2016
Annual Physical Assessment



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URS Project Number:
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December 2016

URS

WEXFORD
Annual Physical Assessment
Summary

For the 2016 Wexford Annual Physical Assessment, geomorphic surveys were conducted on November 16, December 7, and 9, 2016 to prepare a 2,400-foot long stream profile and four cross sections. The location of the geomorphic survey can be viewed on Figure 1. The purpose of the data collection was to compare the 2016 data with data collected since 2009 to see if any changes to the stream's condition, either aggradation or degradation, is occurring. Stream bed and water surface elevations, in addition to various bankfull elevations, were obtained along the profile and stream bed features were identified and noted at each data collection point along the profile. Elevations along the cross sections were obtained from the previously set bank pins on the left side of the stream (facing downstream) to the bank pins on the right side of the stream. Top of bank, bankfull, left and right edges of water, and thalweg locations were noted on the cross sections. The location of each bank pin for the four cross sections was collected with Trimble™ GeoXH handheld GPS receivers. The GPS positions were post-processed and plotted to verify accuracy. The cross section bank pin locations can be seen on Figure 1.

The profile and cross section data collected for 2016 were superimposed over the data collected for years 2012 to 2015. The 2016 profile data generally shows a slight trend of channel thalweg incision and pool deepening, especially in the lower 1,200 linear feet. The channel appears unable to transport the sediment load, which results in large mid-channel and lateral bar formation. These depositional features, comprised of cobble size material, increase near bank shear stresses that result in erosion of the bank and bed. Downed trees and large wood debris have also caused local bed and bank erosion at several locations. Several large trees were observed to have fallen in the stream channel between the 2015 and 2016 surveys. Specific examples can be seen in the photographs below.

2015 Survey: STA 8+25, looking upstream

2016 Survey: STA 8+10, looking upstream

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Annual Physical Assessment
Summary

2015 Survey: STA 20+00, looking upstream

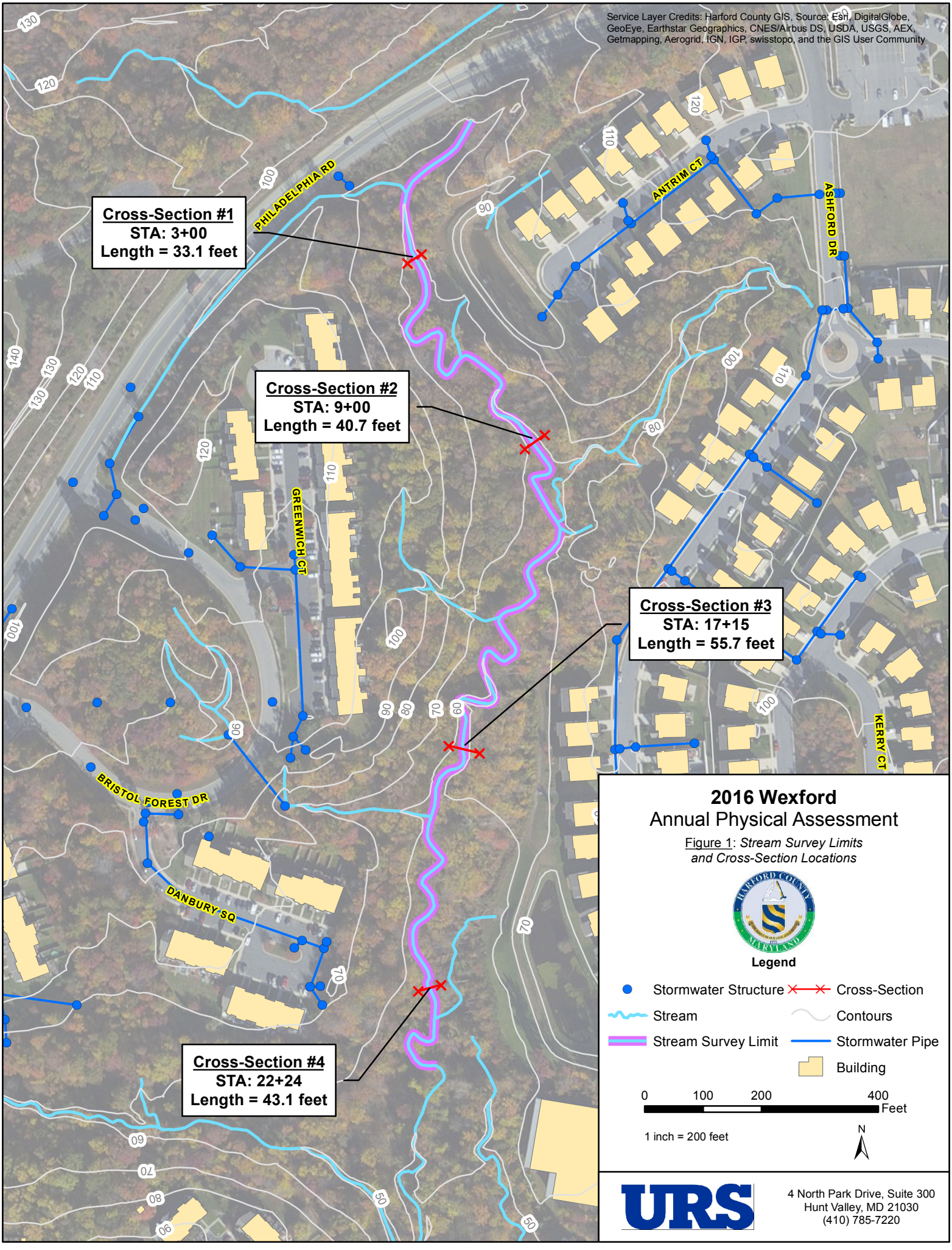
2016 Survey: STA 19+50, looking downstream

Notable changes in the channel bed include from station 18+00 to 24+00, where the channel appears to be downcutting and pools have deepened. Scour pools due to log jams are present at station 12+90 and 14+40. Throughout the reach, large lateral and mid-channel bars, comprised of loose sand and gravel overwhelm the channel and are frequently shifted by storm flows. This is most obvious in the lower half of the reach, as the thalweg has shifted as a result of mobilization of the sand and gravel bars. The stream banks and bed in the vicinity of the sewer encasement at station 23+90 continue to degrade, the area should be monitored closely.

All four of the cross sections classify as unstable F4 type channels with entrenchment ratios of 1.2 - 1.4 and width to depth ratios greater than 12. Sediment supply is high due to eroding stream banks and results in frequent transverse bars and riffles. The 2016 survey shows little change to cross section 1. Cross section 2 continues its slow left bank retreat due to high near bank stress caused by deposition along the right side of the channel. Cross section 3 shows some minor bed incision. Cross section 4 shows the most change this year with some minor bed incision and erosion along the lower section of the right bank.

While there are no major changes to the cross sections there is evidence of erosion throughout the study area including newly fallen trees and movement of large woody debris. Downed trees and limbs continue to cause accelerated bank and bed erosion. Trees along the top of bank continue to be undermined and will cause additional problems in the future.

Included in this report is the longitudinal profile data, presented by station, and combined graphics showing the profile data from 2012 to 2016. Also, attached is the survey data for each of the four cross sections and combined data for 2012 to 2016. A photographic log of cross section locations and representative site photographs of key stream features along the profile is also included.


Service Layer Credits: Harford County GIS, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Cross-Section #1
STA: 3+00
Length = 33.1 feet
Cross-Section #2
STA: 9+00
Length = 40.7 feet
Cross-Section #3
STA: 17+15
Length = 55.7 feet
Cross-Section #4
STA: 22+24
Length = 43.1 feet
PHILADELPHIA RD
ANTRIM CT
ASHFORD DR
GREENWICH CT
BRISTOL FOREST DR
DANBURY SQ
KERRY CT
2016 Wexford
Annual Physical Assessment
Figure 1: Stream Survey Limits and Cross-Section Locations
Legend
Stormwater Structure
Cross-Section
Stream
Contours
Stream Survey Limit
Stormwater Pipe
Building
0 100 200 400 Feet
1 inch = 200 feet
N
URS
4 North Park Drive, Suite 300
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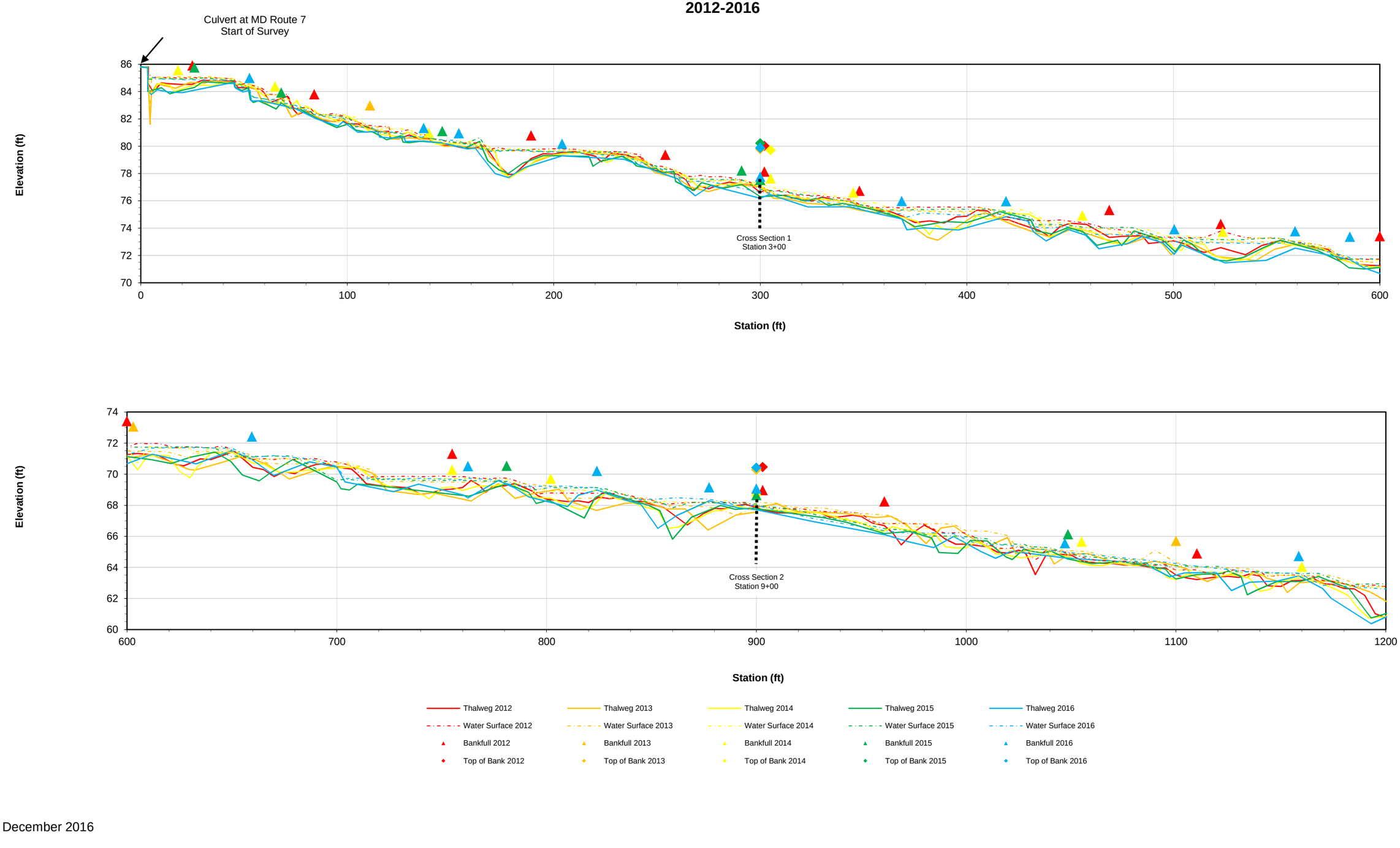
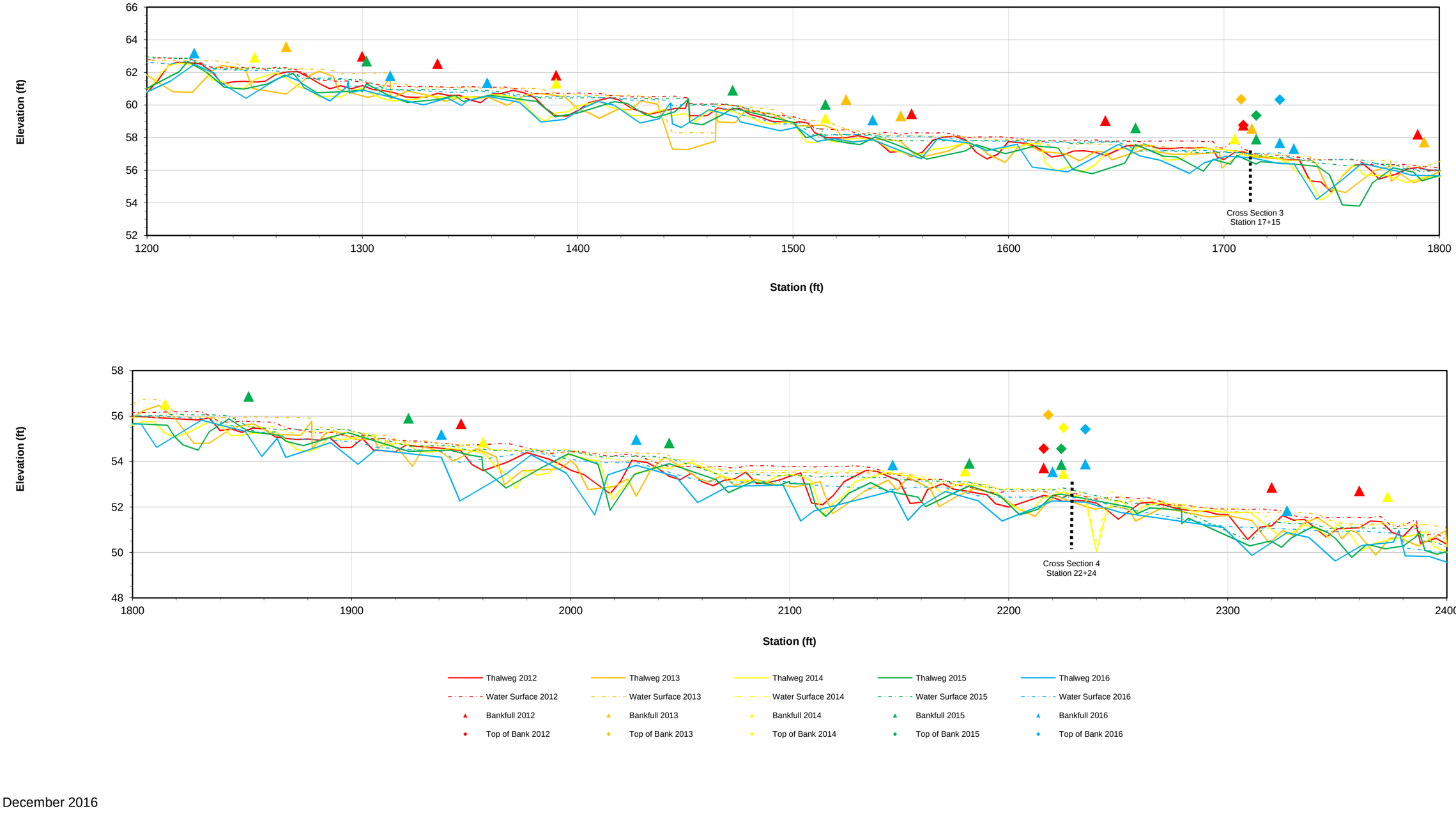
(410) 785-7220

Longitudinal Profile:
Combined Profile 2012 - 2016

Longitudinal Profile Station 0+00 to 12+00
2012-2016



Longitudinal Profile Station 12+00 to 24+00
2012-2016

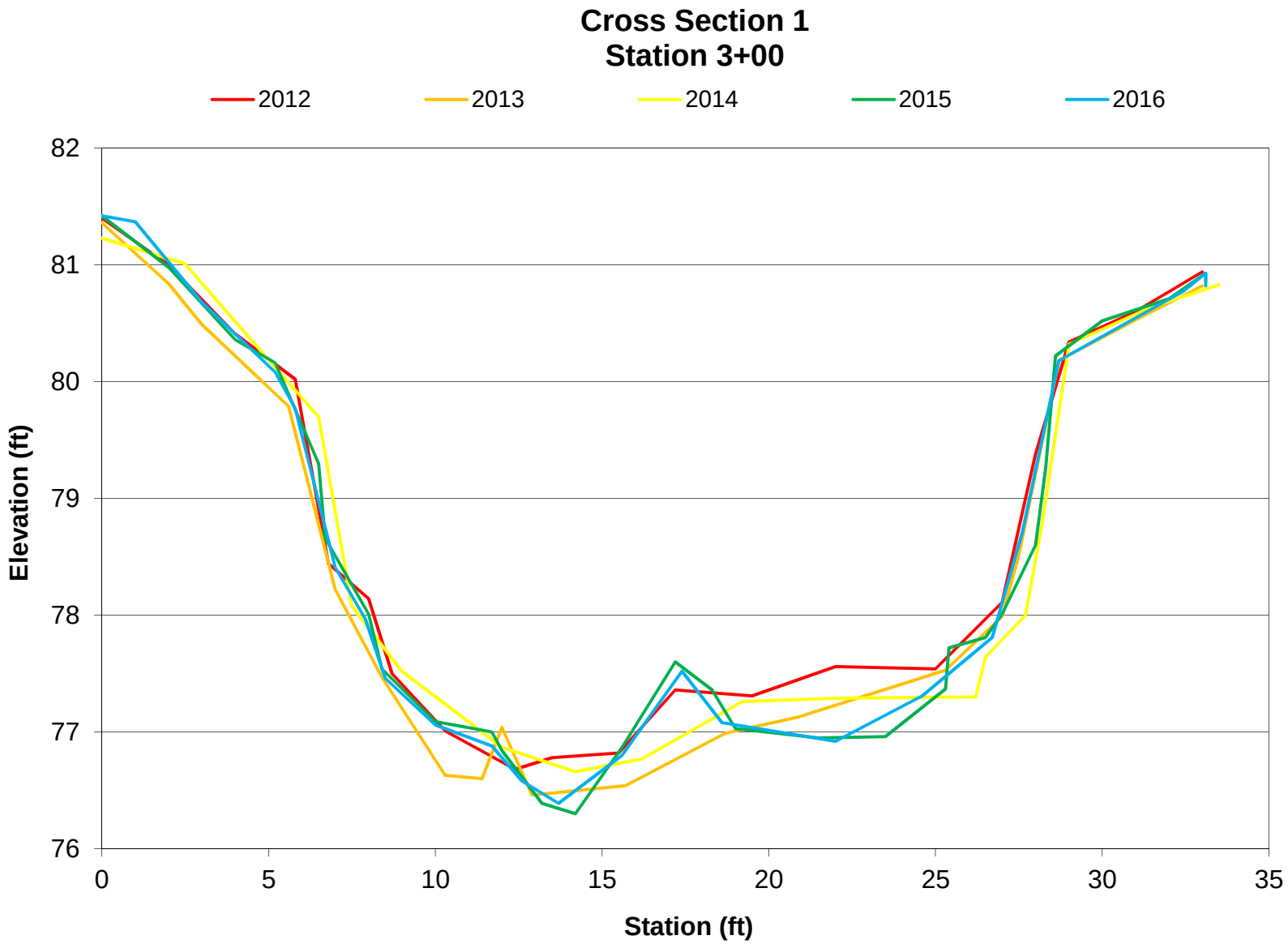


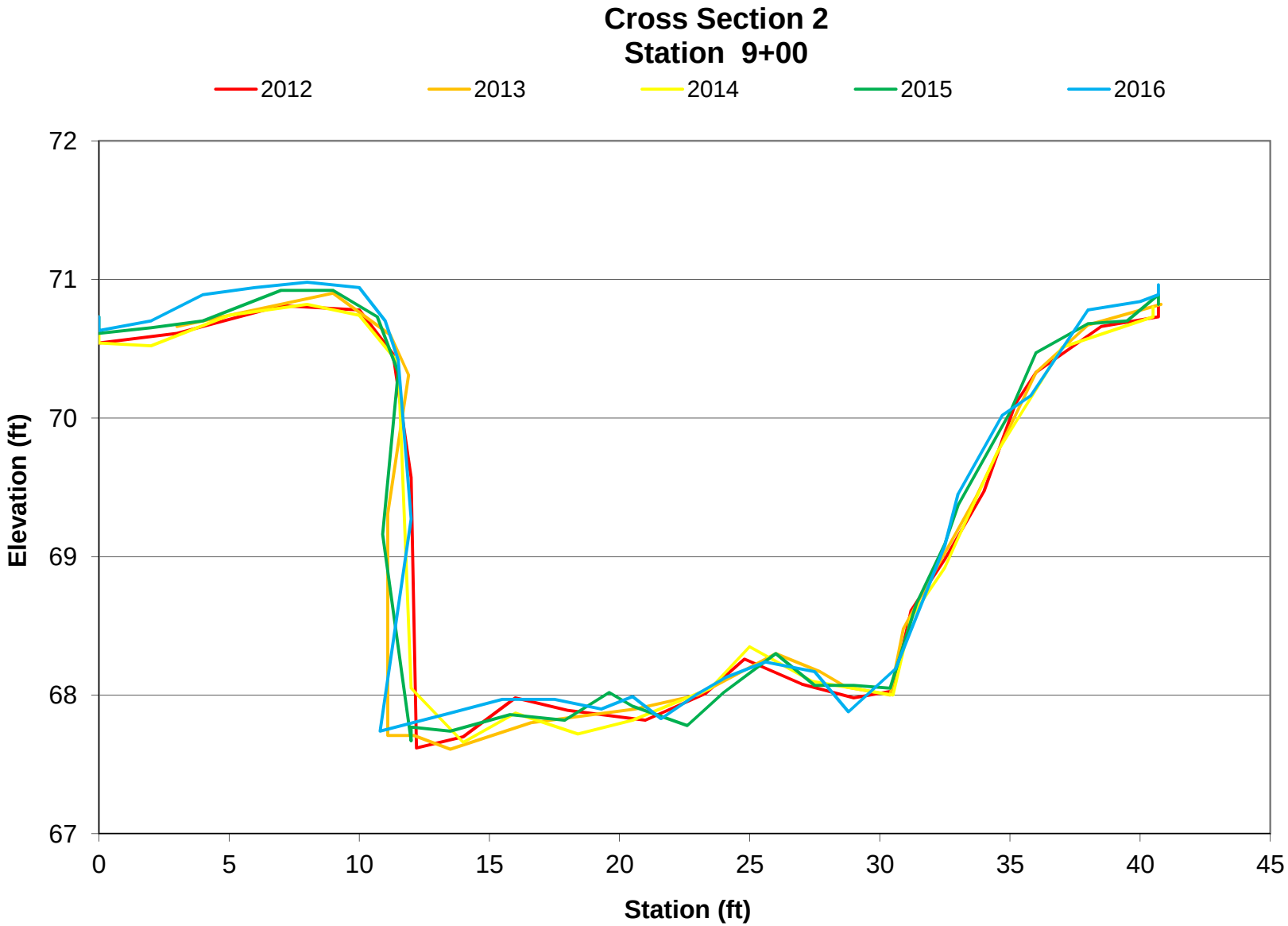
Station	Bed Surface	Water Surface	Bankfull	Top of Bank	Description
0+00.0	85.77	85.84			Existing pipe invert, start of Day 1 of survey
0+03.2	85.76	85.76			End of concrete spillway
0+03.5	84.09	85.07			Drop after spillway
0+05.0	83.78	85.07			Pool, max depth
0+08.0	84.13	84.92			Loose gravel
0+13.0	83.98	84.91			Loose gravel
0+20.0	83.91	84.86			Start tailout of pool
0+42.3	84.59	84.85			Start riprap
0+45.5	84.58	84.63			Step in riffle
0+45.8	84.27	84.45			Bottom of step
0+49.5	83.97	84.34			
0+52.7	84.09	84.23	84.99		Top of headcut (riprap)
0+53.6	83.31	83.59			Bottom of headcut
0+58.7	83.32	83.50			
0+75.0	82.75	82.99			TW at eroded LB
0+85.0	82.01	82.24			
0+95.5	81.48	82.08			
0+98.0	81.80	82.05			Top of slope break
1+05.0	81.03	81.43			Bottom slope break
1+14.7	81.06	81.24			Top of low step
1+15.7	80.66	81.04			Bottom of mini-step
1+22.7	80.60	81.01			
1+27.4	80.68	80.88			Top of mini-step
1+28.2	80.35	80.73			Bottom of low step
1+37.0	80.38	80.64	81.34		
1+46.5	80.22	80.46			
1+52.3	80.00	80.42			Top of low step
1+54.0	79.98	80.34	80.95		
1+58.0	79.80	80.18			
1+62.0	79.86	80.04			
1+65.0	79.25	79.76			Roots along RB, end continuous riprap
1+71.5	78.00	79.57			Pool Dmax
1+78.0	77.71	79.73			Confluence with swale on RB
1+86.0	78.44	79.64			Glide
2+04.0	79.29	79.59	80.18		Riffle start, flat
2+34.0	79.04	79.27			Large, mid-channel deposit
2+60.0	77.61	77.89			Bank stress, large trees falling along RB
2+62.0	77.22	77.42			Pool
2+68.5	76.37	77.43			Scour below log, end riffle
2+76.0	77.12	77.40			Top of riffle
3+00.0	76.19	76.63	77.77	79.88	Cross section #1, thalweg
3+04.5	76.47	76.59			Top of riffle
3+23.0	75.56	76.00			
3+43.5	75.57	75.66			
3+54.0	75.16	75.16			
3+68.5	74.68	75.06	75.99		End riffle
3+71.0	73.88	74.82			Scour along LB, pool, down tree
3+79.0	74.02	75.11			Pool
3+96.0	73.87	74.97			Pool
4+19.0	74.84	75.04	75.98		Top transverse riffle
4+29.5	74.54	74.56			Bottom riffle
4+32.5	73.71	74.10			Step
4+38.5	73.06	74.02			Pool Dmax, RB
4+49.0	73.91	74.09			Top sediment deposit on bend
4+57.5	73.49	73.56			Bottom sediment deposit on bend
4+64.0	72.50	73.55			Scour pool, US of tree
4+78.0	72.88	73.52			Pool DS of tree
4+85.0	73.40	73.51			Top riffle
4+95.0	72.91	72.94			Bottom riffle
5+00.5	72.09	73.02	73.93		Pool, max depth
5+04.0	72.78	72.98			
5+25.0	71.47	72.91			Pool max depth
5+45.0	71.65	72.87			Glide
5+59.0	72.54	72.96	73.78		Top riffle
5+85.5	71.70	71.85	73.37		Bottom riffle
5+92.0	71.11	71.19			
6+00.0	70.68	71.26			
6+12.0	71.28	71.68			Flat pool in meander
6+33.0	70.67	71.71			Pool, max depth
6+50.0	71.52	71.66			Top riffle, rock slug
6+59.5	70.96	71.10	72.42		Bottom riffle, sediment deposition
6+70.0	69.92	71.19			Pool, max depth
6+87.0	70.80	70.99			Top riffle
7+00.0	70.46	70.52			Bottom riffle
7+04.0	69.50	69.72			Start pool
7+12.5	69.27	69.75			Flat pool
7+27.0	68.87	69.69			Flat pool
7+39.0	69.36	69.73			Scour below boulder
7+60.5	68.65	69.65			
7+62.5	68.46	69.74	70.52		Pool, max depth
7+77.0	69.59	69.64			Top riffle
7+84.5	69.14	69.24			Bottom riffle
7+91.5	68.53	69.21			
8+10.0	67.92	69.23			Newly downed tree, pool
8+15.0	68.64	69.16			Glide
8+24.0	68.98	69.14	70.21		Top riffle
8+37.0	68.35	68.43			Bottom riffle
8+45.0	68.06	68.37			

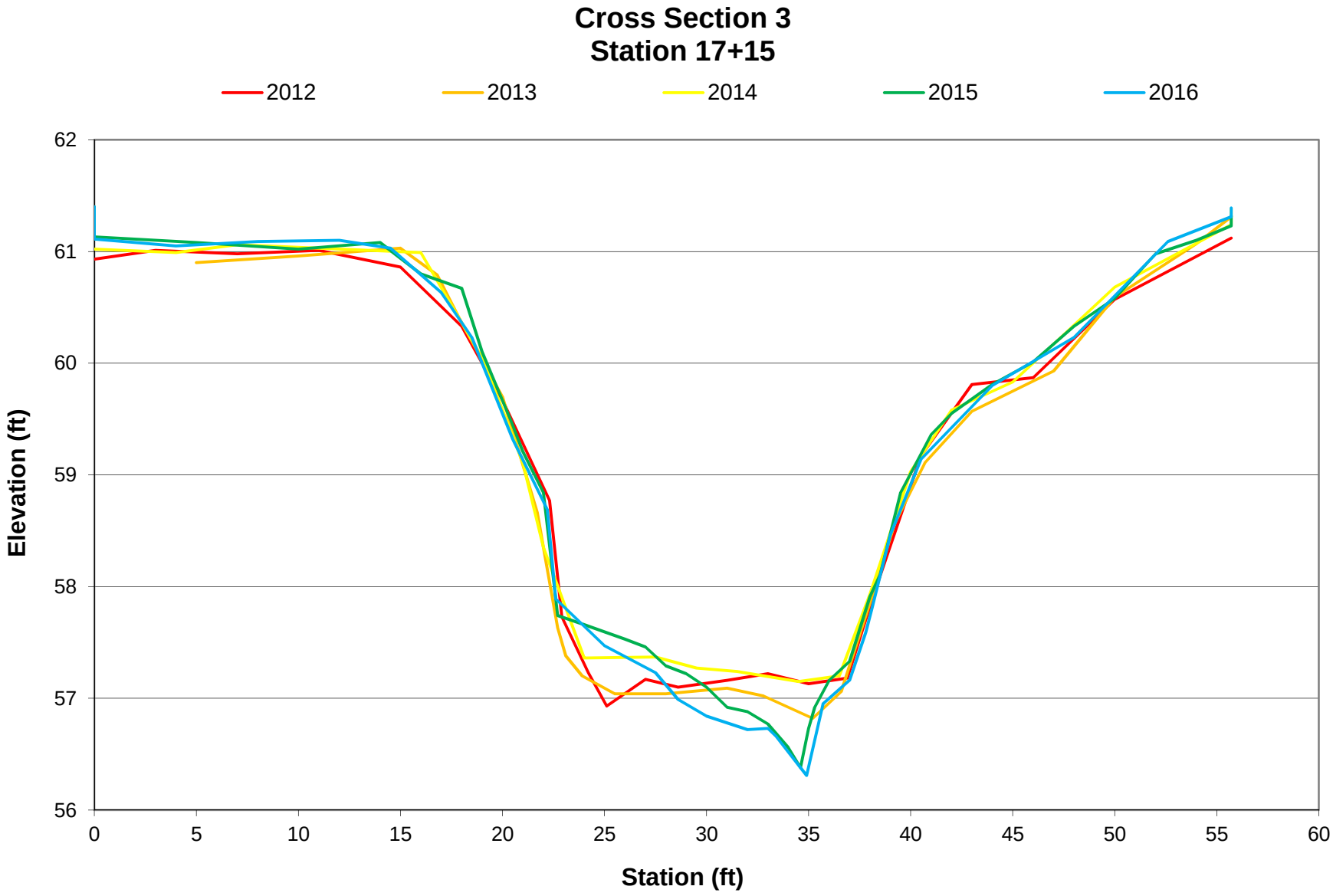
Station	Bed Surface	Water Surface	Bankfull	Top of Bank	Description
8+53.0	66.51	68.39			Pool, max depth LB
8+62.0	67.34	68.48			Glide
8+77.5	68.29	68.38	69.16		Top riffle
8+91.5	67.83	67.98			
9+00.0	67.71	67.99	69.08	70.42	Cross-section #2
9+27.5	66.94	67.14			Start Day 2 of survey, exposed clay, erosion LB, large mid-channel bar
9+61.5	66.09	66.35			End riffle
9+72.0	65.66	66.20			End run
9+84.5	65.28	66.22			Pool, max depth
9+94.0	65.98	66.16			Riffle at boulder cluster
10+07.0	65.02	65.40			Bottom riffle
10+14.0	64.59	65.49			Pool, max depth
10+21.5	65.05	65.40			Top of riffle
10+47.0	64.61	64.99	65.56		Mid riffle, wide channel
10+86.0	64.26	64.46			Bottom riffle
10+89.0	63.95	64.41			Run
10+97.0	63.39	64.31			
11+04.0	63.64	64.16			
11+19.0	63.68	63.94			
11+26.5	62.51	63.85			US of large woody debris
11+35.0	63.04	63.70			Scour below large woody debris
11+48.5	63.12	63.62			
11+58.5	63.45	63.63	64.73		Top of riffle
11+70.0	62.63	62.85			Bottom riffle
11+74.0	62.01	62.86			
11+93.0	60.37	62.67			Pool, max depth, at tree on RB
12+11.0	61.47	62.52			
12+22.0	62.49	62.74	63.19		Top of riffle
12+31.5	61.94	62.19			Bottom of riffle
12+34.0	61.39	62.17			Pool, start
12+46.0	60.41	62.11			Pool, max depth
12+56.0	61.23	62.12			Glide
12+64.0	61.84	62.04			Top of riffle
12+71.0	61.45	61.75			Bottom of riffle
12+73.0	61.07	61.65			End run
12+85.0	60.25	61.65			Pool, max depth
12+93.0	61.12	61.62			Upstream of log in stream
12+93.4	61.46	61.56			Top of log
12+94.0	60.74	61.14			Downstream of log
13+00.0	60.93	61.18			Top of riffle
13+13.0	60.49	60.94	61.79		Bottom of riffle
13+28.5	60.01	60.88			Pool
13+39.5	60.43	60.79			High spot in pool
13+46.0	59.97	60.77			Pool, max depth
13+49.0	60.27	60.82			Glide
13+58.0	60.54	60.82	61.37		Top of riffle
13+73.0	60.17	60.52			Bottom of riffle
13+83.0	58.96	60.51			Pool, max depth
13+94.0	59.12	60.52			Pool, deep spot
14+02.5	59.82	60.54			Glide
14+09.5	60.22	60.47			Top of riffle
14+17.0	59.99	60.39			Bottom of riffle
14+29.0	58.90	60.26			Pool, max depth
14+38.0	59.17	60.35			Pool
14+43.0	60.13	60.23			Top of log
14+44.0	58.85	59.95			Scour, below log
14+48.0	58.62	60.02			Deep spot, below log
14+61.0	59.72	59.97			Top of riffle, above log
14+74.0	59.27	59.62			Top of step
14+75.5	58.97	59.42			Bottom of step
14+94.0	58.42	58.84			
15+02.0	58.64	58.84			
15+11.0	57.77	58.04			Mid-riffle
15+19.0	57.94	58.19			End riffle
15+28.0	57.73	58.21			Compound pool
15+37.0	57.87	58.11	59.08		
15+59.5	56.70	58.09			Pool, max depth
15+67.0	57.92	58.02			Top of riffle
15+82.0	57.66	57.81			Bottom of riffle
15+90.0	57.21	57.79			Compound pool
16+04.0	57.59	57.77			High spot in pool
16+11.0	56.20	57.72			Compound pool
16+27.5	55.90	57.70			Compound pool
16+42.0	56.93	57.75			Glide
16+51.0	57.58	57.72			Top of riffle
16+61.0	56.88	57.18			Bottom of riffle
16+70.5	56.61	57.19			
16+84.0	55.81	57.21			Pool, max depth
16+91.0	56.47	57.22			Glide
17+01.0	56.86	57.12			Top of riffle
17+13.0	56.76	57.01			
17+26.0	56.41	57.07	57.69	60.33	Cross section #3
17+32.5	56.40	56.64	57.33		Bottom of riffle
17+43.0	54.21	56.61			Pool, max depth
17+55.0	55.42	56.66			Start glide
17+64.0	56.43	56.63			Top of riffle, logs/debris
17+80.0	55.96	56.11			Bottom of riffle
17+87.0	55.70	56.09			

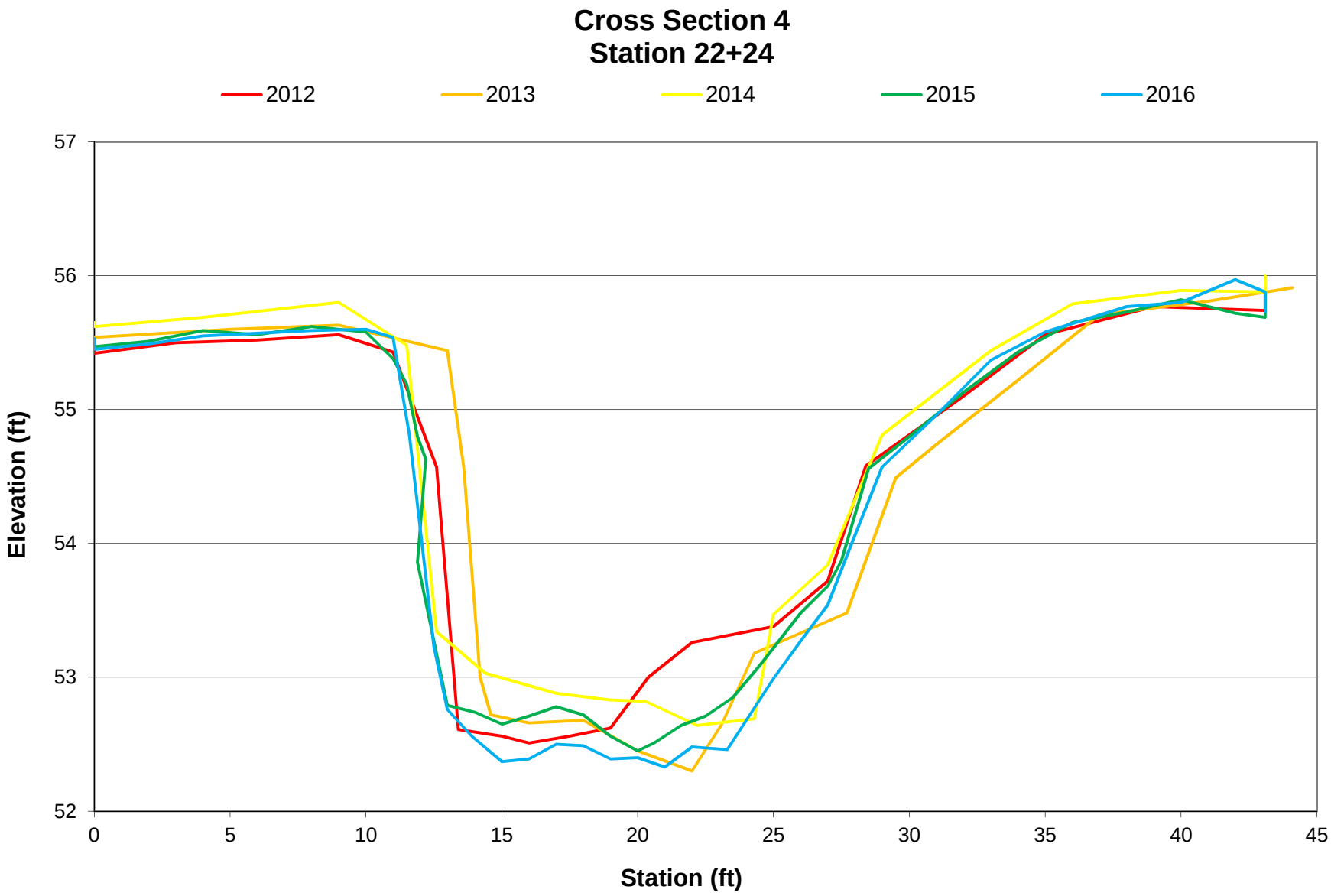
Station	Bed Surface	Water Surface	Bankfull	Top of Bank	Description
18+04.0	55.64	55.99			
18+11.0	54.62	56.00			Pool
18+31.5	55.82	55.90			Start Day 3 of survey, top of riffle
18+51.5	55.32	55.44			Log/Debris
18+59.0	54.22	55.28			Pool, max depth, trib on RB
18+66.0	55.02	55.30			Log/Debris, DS of confluence
18+70.0	54.18	55.00			Scour below log
18+90.5	54.83	54.95			Top of riffle
19+03.0	53.88	54.84			Pool, roots on RB
19+11.0	54.51	54.63			Top of riffle
19+41.0	54.19	54.44	55.19		Bottom of riffle
19+49.5	52.26	53.95			Pool, max depth
19+71.0	53.48	54.26			Glide
19+82.0	54.29	54.45			Top of riffle
19+98.0	53.49	54.12			Scour at logs
20+11.0	51.65	53.95			Pool, max depth
20+17.0	53.41	53.95			Glide
20+30.0	53.83	53.96	54.97		Top of riffle
20+48.0	53.34	53.44			Bottom of riffle
20+58.0	52.19	53.17			Scour, roots on LB
20+72.0	52.91	53.09			Top of riffle
20+97.0	52.96	53.12			Bottom of riffle
21+05.0	51.38	53.02			Deep spot pool, scour at roots on RB
21+11.0	51.82	52.96			Scour, roots on RB
21+36.0	52.71	52.77	53.85		Bottom of riffle
21+54.0	51.42	52.84			Pool, scour at roots on RB
21+60.0	52.04	52.88			Glide
21+71.0	52.68	52.85			Top of riffle
21+86.0	52.27	52.49			Bottom of riffle
21+97.0	51.38	52.43			Scour at roots on RB
22+20.0	52.26	52.44	53.55		Top of riffle
22+35.0	52.21	52.39	53.89	55.42	Cross section #4
22+51.0	51.76	51.96			Mid riffle
22+98.0	51.10	51.15			Bottom of riffle
23+11.0	49.87	51.09			Pool, max depth
23+27.0	50.87	51.03	51.84		Top of riffle
23+37.0	50.66	50.98			Bottom of riffle
23+49.0	49.62	50.92			Pool, scour at roots on RB
23+61.0	50.30	50.94			
23+75.5	50.45	50.85			Upstream of sewer encasement
23+78.0	50.94	50.98			Top of casing
23+81.0	49.85	50.19			Riprap downstream of casing
23+92.0	49.82	50.07			Riprap
24+06.0	49.38	49.92			Pool, DS of riprap
24+11.0	49.43	49.95			Mid pool, end of profile

Cross Sections:
Combined Cross Sections 2012 - 2016


Cross Section 1
Station 3+00
2012
2013
2014
2015
2016
82
81
80
79
78
77
76
Elevation (ft)
0
5
10
15
20
25
30
35
Station (ft)


Cross Section 2
Station 9+00
2012
2013
2014
2015
2016
72
71
70
69
68
67
Elevation (ft)
0
5
10
15
20
25
30
35
40
45
Station (ft)


Cross Section 3
Station 17+15
2012
2013
2014
2015
2016
Elevation (ft)
62
61
60
59
58
57
56
0
5
10
15
20
25
30
35
40
45
50
55
60
Station (ft)


Cross Section 4
Station 22+24
2012
2013
2014
2015
2016
Elevation (ft)
57
56
55
54
53
52
0
5
10
15
20
25
30
35
40
45
Station (ft)

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Annual Physical Assessment
Cross section data

Cross Section 1 at Profile Station 3+00
Surveyed on November 16, 2016

HI
87.86

Station	Rod	Bed Surface	Description
0.0	6.44	81.42	TO pin, LB & Ground
1.0	6.49	81.37	Slope break
3.0	7.18	80.68	
5.2	7.78	80.08	TOB
5.8	8.09	79.77	TO vertical break
7.0	9.45	78.41	Slope break
7.9	9.89	77.97	BKF
8.5	10.40	77.46	Back of bench
10.0	10.80	77.06	Edge of riprap
11.7	10.98	76.88	Near rock
12.6	11.28	76.58	LEOW
13.7	11.47	76.39	Thalweg
15.6	11.06	76.80	Edge of mid-channel bar
17.4	10.34	77.52	TO rock
18.6	10.78	77.08	Edge of mid-channel bar
22.0	10.94	76.92	
24.6	10.55	77.31	REOW
26.7	10.05	77.81	Toe of slope
27.6	9.15	78.71	Mid-bank
28.7	7.68	80.18	TOB
32.4	7.09	80.77	Flat
33.1	6.93	80.93	TO pin, RB
33.1	7.04	80.82	Ground at pin

Description key: L=left, R=right, B=bank, BKF=bankful,
HI = height of instrument, EOW=edge of water, TO=top

WEXFORD
Annual Physical Assessment
Cross section data

Cross Section 2 at Profile Station 9+00
Surveyed on November 16, 2016

HI
78.55

Station	Rod	Bed Surface	Description
0.0	7.82	70.73	TO pin, LB
0.0	7.92	70.63	Ground at pin
2.0	7.85	70.70	
4.0	7.66	70.89	
6.0	7.61	70.94	
8.0	7.57	70.98	
10.0	7.61	70.94	
11.0	7.85	70.70	
11.5	8.13	70.42	TOB
12.0	10.81	67.74	Bed at overhang
10.8	9.28	69.27	Undercut
13.5	10.68	67.87	LEOW
15.5	10.58	67.97	
17.5	10.58	67.97	
19.3	10.65	67.90	
20.5	10.56	67.99	
21.6	10.72	67.83	Thalweg
23.0	10.54	68.01	
24.1	10.42	68.13	REOW
25.6	10.31	68.24	
27.5	10.38	68.17	
28.8	10.67	67.88	
30.6	10.36	68.19	Toe of slope
32.5	9.47	69.08	BKF
33.0	9.10	69.45	Mid-bank
34.7	8.53	70.02	TOB
35.8	8.39	70.16	
38.0	7.77	70.78	
40.0	7.71	70.84	
40.7	7.66	70.89	Ground at pin
40.7	7.59	70.96	TO pin, RB

Description key: L=left, R=right, B=bank, BKF=bankful,
HI = height of instrument, EOW=edge of water, TO=top

Cross Section 3 at Profile Station 17+15

Surveyed on December 7, 2016

HI
66.12

Station	Rod	Bed Surface	Description
0.0	4.72	61.40	Ground at pin, LB
0.0	5.01	61.11	TO pin, LB
4.0	5.07	61.05	
8.0	5.03	61.09	
12.0	5.02	61.10	
14.5	5.09	61.03	Break in slope
17.0	5.49	60.63	
18.5	5.89	60.23	TOB
20.5	6.80	59.32	
22.2	7.43	58.69	Top of bench
22.6	8.23	57.89	Back of bar
25.0	8.65	57.47	Mid-bar
27.5	8.89	57.23	
28.6	9.13	56.99	LEOW
30.0	9.28	56.84	
32.0	9.40	56.72	
33.0	9.39	56.73	
33.4	9.46	56.66	Scour from log/debris
34.9	9.81	56.31	Thalweg
35.7	9.17	56.95	REOW
37.0	8.96	57.16	Bottom of bank
37.8	8.53	57.59	BKF
38.1	8.32	57.80	
39.0	7.66	58.46	Break in slope
40.5	6.98	59.14	TOB
44.0	6.32	59.80	
48.0	5.89	60.23	
52.6	5.03	61.09	Break in slope
55.7	4.81	61.31	Ground at pin, RB
55.7	4.73	61.39	TO pin, RB

Description key: L=left, R=right, B=bank, BKF=bankful,
HI = height of instrument, EOW=edge of water, TO=top

WEXFORD
Annual Physical Assessment
Cross section data

Cross Section 4 at Profile Station 22+24
Surveyed on December 9, 2016

HI
60.31

Station	Rod	Bed Surface	Description
0.0	4.78	55.53	TO pin, LB
0.0	4.86	55.45	Ground at pin, LB
2.0	4.82	55.49	
4.0	4.76	55.55	
6.0	4.74	55.57	
8.0	4.72	55.59	
10.0	4.71	55.60	
11.0	4.77	55.54	TOB
11.6	5.50	54.81	Slope break
12.5	7.08	53.23	Toe of bank
13.0	7.55	52.76	
13.9	7.75	52.56	LEOW
15.0	7.94	52.37	
16.0	7.92	52.39	
17.0	7.81	52.50	
18.0	7.82	52.49	
19.0	7.92	52.39	
20.0	7.91	52.40	
21.0	7.98	52.33	Thalweg
22.0	7.83	52.48	
23.3	7.85	52.46	REOW
25.0	7.32	52.99	
26.0	7.04	53.27	
27.0	6.77	53.54	
27.9	6.30	54.01	BKF
29.0	5.74	54.57	TOB
31.0	5.35	54.96	
33.0	4.94	55.37	Slope break
35.0	4.73	55.58	
38.0	4.54	55.77	
40.0	4.51	55.80	
42.0	4.34	55.97	
43.1	4.43	55.88	TO pin, RB
43.1	4.58	55.73	Ground at pin, RB

Description key: L=left, R=right, B=bank, BKF=bankful,
HI = height of instrument, EOW=edge of water, TO=top

Photographic Log:
2016 Longitudinal Profile

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: November 16th, 2016

STA 0+50 - Upstream

STA 0+50 - Downstream

STA 1+00 - Upstream

STA 1+00 - Downstream

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: November 16th, 2016

STA 1+50 - Upstream

STA 1+50 - Downstream

STA 2+00 - Upstream

STA 2+00 - Downstream

URS

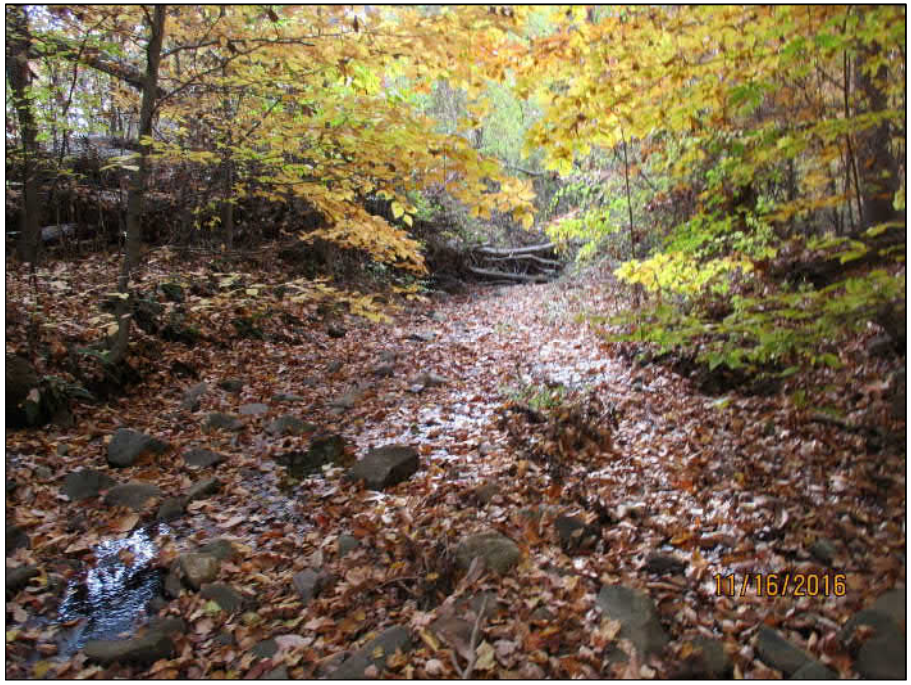
Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: November 16th, 2016

STA 2+50 - Upstream

STA 2+50 - Downstream

STA 3+00 - Upstream



STA 3+00 - Downstream

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: November 16th, 2016

STA 3+50 - Upstream

STA 3+50 - Downstream

STA 4+00 - Upstream

STA 4+00 - Downstream

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: November 16th, 2016

STA 4+50 - Upstream

STA 4+50 - Downstream

STA 5+00 - Upstream

STA 5+00 - Downstream

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: November 16th, 2016

STA 5+50 - Upstream

STA 5+50 - Downstream

STA 6+00 - Upstream

STA 6+00 - Downstream

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: November 16th, 2016

STA 6+50 - Upstream

STA 6+50 - Downstream

STA 7+00 - Upstream

STA 7+00 - Downstream

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: November 16th, 2016

STA 7+50 - Upstream

STA 7+50 - Downstream

STA 8+00 - Upstream

STA 8+00 - Downstream

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: November 16th, 2016

STA 8+50 - Upstream

STA 8+50 - Downstream

STA 9+00 - Upstream

STA 9+00 - Downstream

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: December 7th, 2016

STA 9+50 - Upstream

STA 9+50 - Downstream

STA 10+00 - Upstream

STA 10+00 - Downstream

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: December 7th, 2016

STA 10+50 - Upstream

STA 10+50 - Downstream

STA 11+00 - Upstream

STA 11+00 - Downstream

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: December 7th, 2016

STA 11+50 - Upstream

STA 11+50 - Downstream

STA 12+00 - Upstream

STA 12+00 - Downstream

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: December 7th, 2016

STA 12+50 - Upstream

STA 12+50 - Downstream

STA 13+00 - Upstream

STA 13+00 - Downstream

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: December 7th, 2016

STA 13+50 - Upstream

STA 13+50 - Downstream

STA 14+00 - Upstream

STA 14+00 - Downstream

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: December 7th, 2016

STA 14+50 - Upstream

STA 14+50 - Downstream

STA 15+00 - Upstream

STA 15+00 - Downstream

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: December 7th, 2016

STA 15+50 - Upstream

STA 15+50 - Downstream

STA 16+00 - Upstream

STA 16+00 - Downstream

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: December 7th, 2016

STA 16+50 - Upstream

STA 16+50 - Downstream

STA 17+00 - Upstream

STA 17+00 - Downstream

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STA 18+00 - Upstream

STA 18+00 - Downstream

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STA 19+00 - Upstream

STA 19+00 - Downstream

STA 19+50 - Upstream

STA 19+50 - Downstream

STA 20+00 - Upstream

STA 20+00 - Downstream

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: December 9th, 2016

STA 20+50 - Upstream

STA 20+50 - Downstream

STA 21+00 - Upstream

STA 21+00 - Downstream

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: December 9th, 2016

STA 21+50 - Upstream

STA 21+50 - Downstream

STA 22+00 - Upstream

STA 22+00 - Downstream

URS

Wexford 2016 Annual Physical Assessment – Longitudinal Profile

Date: December 9th, 2016

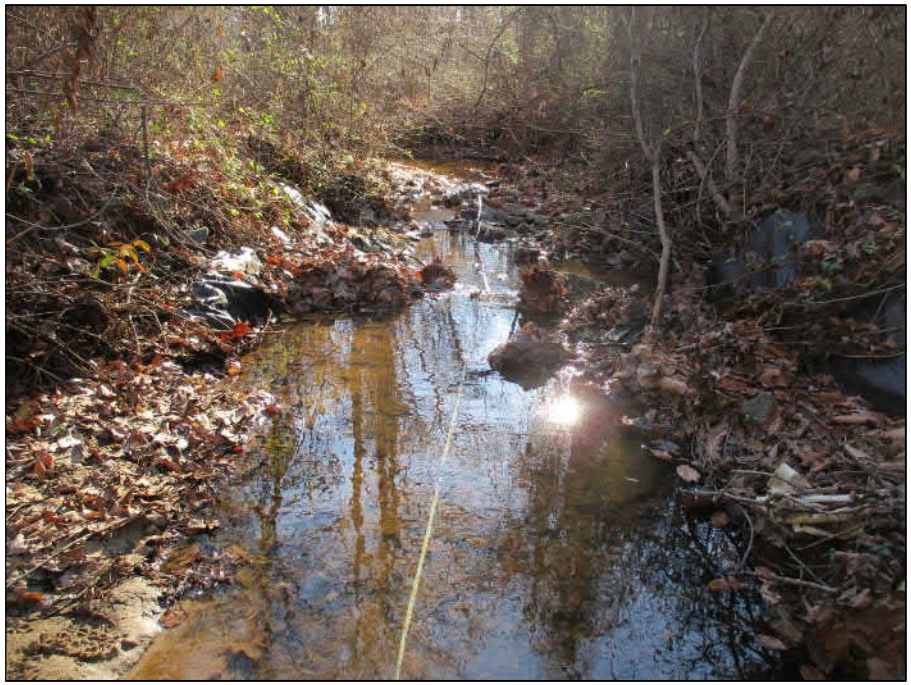
STA 22+50 - Upstream

STA 22+50 - Downstream

STA 23+00 - Upstream

STA 23+00 - Downstream

STA 23+50 - Upstream



STA 23+50 - Downstream

STA 24+00 - Upstream

STA 24+00 - Downstream

Photographic Log:
2016 Cross Sections

URS

Wexford 2016 Annual Physical Assessment – Cross Sections

Date: November 16th, 2016

STA 3+00 – Cross Section #1: Upstream

STA 3+00 – Cross Section # 1: Downstream

STA 3+00 – Cross Section #1: Left Bank

STA 3+00 – Cross Section #1: Right Bank

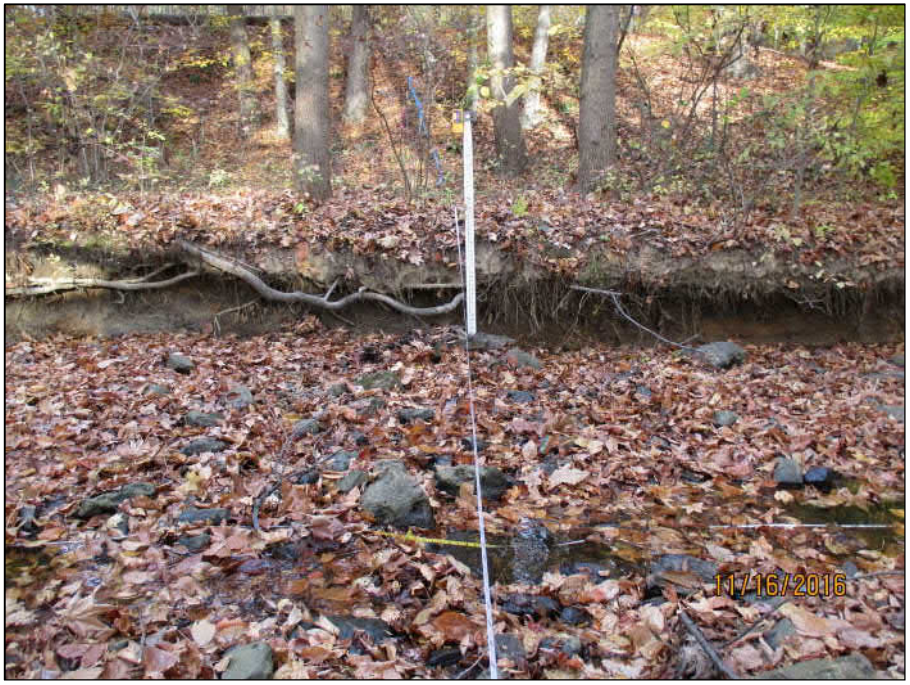
URS

Wexford 2016 Annual Physical Assessment – Cross Sections

Date: November 16th, 2016

STA 9+00 – Cross Section #2: Upstream

STA 9+00 – Cross Section #2: Downstream



STA 9+00 – Cross Section #2: Left Bank

STA 9+00 – Cross Section #2: Right Bank

STA 17+15 – Cross Section #3: Upstream

STA 17+15 – Cross Section #3: Downstream

STA 17+15 – Cross Section #3: Left Bank

STA 17+15 – Cross Section #3: Right Bank

STA 22+24 – Cross Section #4: Upstream

STA 22+24 – Cross Section #4: Downstream

STA 22+24 – Cross Section #4: Left Bank

STA 22+24 – Cross Section #4: Right Bank